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International Disaster Research

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No existing telecommunications system can be expected to provide strategy and tactics appropriate to the complex, many faceted problem of disaster. It is the ultimate in wishful thinking to expect systems, hardware, and software designed for one purpose or region of the globe to be magically applicable to these massive events which destroy or damage human life, property, and societal organizations.

Despite the exciting capabilities of space, communications, remote sensing, and the miracles of modern medicine, complete turnkey transfers to the disaster problem do not make the fit, and cannot be expected to do so.

In 1980, a Presidential team, assigned the mission of exploring disaster response within the U.S. Federal Government, encountered an unanticipated obstacle: disaster was essentially undefined. Its life cycle was incompletely understood and management, therefore, largely ad hoc, lacking the precision of other areas of science and technology. In the absence of a scientifically based paradigm of disaster, there can be no measure of cost effectiveness, optimum design of manpower structure, or precise application of any technology. These problems spawned a 10-year, multidisciplinary study designed to define the origins, anatomy, and necessary management techniques for catastrophes, which was conducted at the Center for Strategic and International Studies with the encouragement and assistance of the Uniformed Services University of the Health Sciences.

The design of the study necessarily reflects interests and expertise in disaster medicine, emergency medicine, telecommunications, computer communications, and forensic sciences. The study owes a great deal to Dr. Prem Gupta, Managing Director of CMC Limited, an Indian governmental corporation, and the members of Dr. Gupta's staff, who generously contributed their time and knowledge, to Dr. Glen McWright, a Senior Forensic Scientist who served with the U.S. Federal Bureau of Investigation, and to Dr. S. Ramani, Senior Research Scientist with the Indian National Centre for Software Development. Another great contribution to this study was the leadership of Dr. Gupta and Dr. Farouk Kamoun, President of Centre National de l'Informatique in Tunisia, in bringing to bear the knowledge of 127 scientific and governmental specialists of the industrialized and developing nations.

Research methodologies were constructed: the phenomena of disasters were examined, along with case histories of 100 large-scale destructive events which had occurred in the 20th century. Viewed through the investigatory lens of the many disciplines applicable to these catastrophic events, a surprising number of commonalities slowly became apparent. Within the parameters established by a working definition, applicable to both sudden and “creeping” disasters, a common, temporal model was identified. The definition which we ultimately used: was any permutation of human injury, property damage, the overwhelming of local resources and the ultimate disruption of the fabric of society. We were surprised to find that the common elements occurred not only in natural but in industrial/technological and conflict disasters. A taxonomy was developed which elaborated on these major categories of disaster. It soon became evident that examination of all three of these major categories of disaster were necessary for our study, and that economy and cost-effectiveness in response to disaster lay in including all major etiologies of disaster. No matter how comfortable a study limited exclusively to natural disasters is, attractive because of its apolitical and “sanitized” nature, such studies appeared to us to be fragmentary and unscientific. Indeed, a common, temporal model, a template if you will, evolved.

The phases of a temporal model of disaster include

- A quiescent phase—A period of time in which the causative factors ebb and flow harmlessly until such time as the mixture assembles, often randomly, into a critical and inevitable disaster pattern
- A prodromal phase—The point at which the inevitability and criticality of the pattern becomes clear and some predictions become possible about the timing of the oncoming catastrophe
- A disaster phase—The time of cataclysm during which acute damage to human beings, to property and to the fabric of society occurs
- A recovery phase—The repair period during which normal sociopolitical relationships are restored, people are healed, and the destruction of property repaired.

From the standpoint of the construction of data banks, remote sensory surveillance, telecommunications, and management, it is convenient to divide networks into strategic and tactical. The ongoing role of networks in monitoring the behavior and emergence of disasters from their pre-cataclysmic events through the completion of recovery is perceived as a permanent strategic function. It consists of remote sensing, global communications networks, and data banks. The sensing and monitoring needs of the disaster phenomena utilize space, atmospheric, ground surface, underground surface, and undersea areas on a continuous and global basis. It clearly is an activity to be carried out by a consortium of nations, or by the United Nations itself. From the prodromal stage of warning, to the actual management of erupting disaster, data from the

strategic network, including appropriate consultation, should be dedicated to mobile apparatus at the beck and call of the on-site disaster manager. The disaster manager in control of tactical deployment of men and resource allocation is essentially a temporary local area network (LAN). A purposeful, tactical network will provide long term benefits to future disasters by input of quantified data. In studying our 100 cases, we quantified mortality, morbidity and property damage. Clearly this is an activity which extends into the recovery phase.

The need for custom-tailoring of tactical communications systems presently available and necessary for real time command, control, communication, search and rescue, management of the wounded, population evacuation, and other requirements of acute disaster management became evident.

Twentieth century response to the sick and injured of non-disaster injury is almost universally a labor intensive, medical procedure. When preparing for massive numbers of casualties, search and rescue and emergency resuscitation (reanimatology) must be carried out initially by first responders at the site, and by local people, who are themselves uninjured and who can engage in search and rescue. A body of knowledge is slowly being accumulated which can form the essential data bank to be used as a resource for the austere measures to be carried out by essentially non-medical echelons of rescuers. Instruction for reanimatology can be provided to remote areas via the tactical LAN.

CASE ANALYSIS

Lessons learned after thousands of hours of air and other travel to industrialized and developing nations revealed the special and counterdistinctive needs of the many cultures, religions, legal systems, as well as the political goals and constraints demanded by regional disaster management communications. The values derived from working alongside our colleagues in the communications and medical establishments of Western Europe and of developing areas in Asia are emphasized.

At about 1:00 a.m. on December 2, 1984, a typical cascade of unhappy events occurred at the Union Carbide Plant near the community of Bhopal in Madhya Pradesh, India. A few lessons in the provision of both strategic and tactical telecommunications stand out at the cost of 4,000 deaths, and approximately 365,000 permanently injured victims. From a strategic standpoint, the area disaster managers were not able to access data on the pathophysiology of methyl isocyanate. In discussions with Mr. I. Sathyam, the senior civil servant in charge of the long term recovery of the area, it seemed evident that a LAN, whose sensors could measure the toxic emission at its onset, and combine that information with the prevailing wind at that moment, could have automatically provided, through permanent loudspeakers, the need to evacuate the area, and the

route of evacuation. We have estimated that had such a system been in place, and been able to provide emergency evacuation instructions in the 14 languages of India, the morbidity and mortality might have been reduced to 10 percent of the awful total. Armed with that information, several of us, working with the computer and communications scientists in their own offices, devised just such an LAN. In collaboration with local experts, we have devised other telecommunications system which we hope will be effective. With the energetic cooperation of Air Vice Marshal John Lessels, the former Director General of the Australian Natural Disaster Organization, and the staff of the Australian Counter Disaster College, we have devised combative measures against some of Australia's major catastrophic threats.

The major capitols of the world are not without numerous conflict disasters. In working with first responders from the police, fire and medical agencies of New York and London, and the GSD-9 officers of what is now Berlin, we have learned a great deal from the communications systems. They supply models for global strategic and tactical networks.

Communications networks are the routes of international disaster diplomacy. The success of international disaster research and management hinges on the specialized sensitive application of traditional manual and high technological systems.